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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,177	10/20/2003	Juanita DeLoach	TI 35986	2711
23494	7590	02/09/2006	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			GUERRERO, MARIA F	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 02/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/689,177

Applicant(s)

DELOACH ET AL.

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is in response to the Request for continued examination filed January 24, 2006.

Status of Claims

2. Claims 1-20 are pending.

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 24, 2006 has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3 and 5-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Tseng (U.S. 6,093,621).

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5. Tseng discloses forming an opening in a substrate (100) through a patterned photoresist layer (106) and a hard-mask layer (silicon nitride) (104) located over the substrate with a plasma (Fig. 1A-1B, col. 2, lines 1-6, 38-55). Tseng teaches trimming the photoresist layer with a plasma to create an exposed portion of the hard-mask layer (Fig. 1C, col. 2, lines 1-10, col. 3, lines 1-5). Tseng shows removing the exposed portion with a plasma to create a trench guide opening and after removing the exposed portion creating a trench through the trench guide opening with a plasma (Fig. 1D, col. 3, lines 5-20). Tseng teaches forming an oxide liner in the trench, depositing an oxide in the trench to form an isolation structure, and removing the hard-mask (Fig. 1E-1H, col. 3, lines 19-42).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 2, 4 and 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tseng (U.S. 6,093,621) in view of Miller (U.S. 6,287,974).

7. Tseng discloses forming an opening in a substrate (100) through a patterned photoresist layer (106) and a hard-mask layer (silicon nitride) (104) located over the substrate with a plasma (Fig. 1A-1B, col. 2, lines 1-6, 38-55). Tseng teaches trimming the photoresist layer with a plasma to create an exposed portion of the hard-mask layer (Fig. 1C, col. 2, lines 1-10, col. 3, lines 1-5). Tseng shows removing the exposed portion with a plasma to create a trench guide opening and creating a trench through the trench guide opening with a plasma (Fig. 1C-1D, col. 3, lines 1-20). Tseng teaches forming an oxide liner in the trench, depositing an oxide in the trench to form an isolation structure, and removing the hard-mask (Fig. 1E-1H, col. 3, lines 19-42).

Tseng does not specifically show patterning the opening through a bottom anti-reflective coating (BARC) layer located between the photoresist and the hard-mask layer. Tseng does not specifically describe employing the same plasma tool, the source power, bias power, and flow rate as claimed. However, Miller teaches the bottom anti-reflective coating (BARC) layer may be disposed between the nitride layer and the photoresist layer to help the transfer of critical dimensions of the photoresist onto the nitride (col. 10, lines 54-60). Miller shows employing the same plasma tool (col. 4, lines 38-46, col. 6, lines 10-15, col. 8, lines 25-28). Miller discloses using gases including

HBr, O₂, and Ar, the flow rate from 0 sccm to 100 sccm, and the power within in the range (col. 8, lines 40-63, col. 9, lines 25-30).

In addition, the selection of the flow rate and power is considered to be obvious because it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). There is not evidence that the particular range is critical. In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). See MPEP § 716.02 - § 716.02(g).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the Tseng reference by including the teachings of Miller i.e., the bottom anti-reflective coating (BARC) layer, the same plasma tool, in order to improve productivity (Miller, col. 2, lines 52-60).

8. Claims 10-11, 13, 15-17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tseng (U.S. 6,093,621) in view of Kadosh et al. (U.S. 5,770,483).

Tseng discloses forming an opening in a substrate (100) through a patterned photoresist layer (106) and a hard-mask layer (silicon nitride) (104) located over the substrate with a plasma (Fig. 1A-1B, col. 2, lines 1-6, 38-55). Tseng teaches trimming the photoresist layer with a plasma to create an exposed portion of the hard-mask layer (Fig. 1C, col. 2, lines 1-10, col. 3, lines 1-5). Tseng shows removing the exposed portion with a plasma to create a trench guide opening and creating a trench through the trench guide opening with a plasma (Fig. 1D, col. 3, lines 5-20). Tseng teaches forming an oxide liner in the trench, depositing an oxide in the trench to form an isolation structure,

and removing the hard-mask (Fig. 1E-1H, col. 3, lines 19-42). Tseng teaches a pad oxide layer located between the substrate and the hard-mask layer.

Tseng does not specifically show forming transistors on the active regions and forming interconnects over the transistors to form an operative integrate circuit in the description of the preferred embodiments. However, Tseng discloses a method of forming an integrated circuit and more particularly a method of forming a shallow trench isolation structure (col. 1, lines 5-8). Tseng describes after fabricating the shallow trench isolation structure is conventional to form a transistor on an active region (col. 1, lines 23-42).

In addition, Kadosh et al. teaches forming trench isolation structures between active areas (Fig. 1, 3, 7, col. 4, lines 43-65). Kadosh et al. shows forming transistors on the active regions including forming wells and source and drain regions and forming interconnects over the transistors to form an operative integrate circuit (Abstract, Fig. 7-9, col. 1, lines 22-32, col. 3, lines 4-15, col. 5, lines 1-10, col. 6, lines 5-50).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Tseng reference by including the interconnects over the transistors to complete the integrate circuit as suggested by Kadosh et al. in order to provide a multilevel transistor fabrication process having high performance interconnections and a shallow trench isolation without damaging the substrate (Kadosh et al., Abstract; Tseng, col. 1, lines 5-8, 65-67).

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9. Claims 12, 14, 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tseng (U.S. 6,093,621) and Kadosh et al. (U.S. 5,770,483) as applied to claims 11, 13-17 above, and further in view of Miller (U.S. 6,287,974).

The combination of Tseng and Kadosh et al. does not specifically show patterning the opening through a bottom anti-reflective coating (BARC) layer located between the photoresist and the hard-mask layer. The combination of Tseng and Kadosh et al. does not specifically describe employing the same plasma tool, the source power, bias power, and flow rate as claimed. However, Miller teaches the bottom anti-reflective coating (BARC) layer may be disposed between the nitride layer and the photoresist layer to help the transfer of critical dimensions of the photoresist onto the nitride (col. 10, lines 54-60). Miller shows employing the same plasma tool (col. 4, lines 38-46, col. 6, lines 10-15, col. 8, lines 25-28). Miller discloses using gases including HBr, O₂, and Ar, the flow rate from 0 sccm to 100 sccm, and the power within in the range (col. 8, lines 40-63, col. 9, lines 25-30).

In addition, the selection of the flow rate and power is considered to be obvious because it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). There is not evidence that the particular range is critical. In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). See MPEP § 716.02 - § 716.02(g).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Tseng and Kadosh et al. by including

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the teachings of Miller i.e., the bottom anti-reflective coating (BARC) layer, the same plasma tool, in order to improve productivity (Miller, col. 2, lines 52-60).

Response to Arguments

10. Applicant's arguments filed January 24, 2006 have been fully considered but they are not persuasive. Claims 1-20 stand rejected.

11. Applicant argued that Tseng does not disclose or suggest creating the trench after removing the exposed portion. However, Tseng shows removing the exposed portion with a plasma to create a trench guide opening (Fig. 1B-1C, col. 2, lines 45-67) and after removing the exposed portion creating a trench (108a) through the trench guide opening with a plasma (Fig. 1C-1D, col. 3, lines 1-20).

12. Furthermore, "The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." In re Heck, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting In re Lemelson, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968)). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir.1998).

13. In addition, a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art

reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). >"When a claim covers several structures or compositions, either generically or as alternatives, the claim is deemed anticipated if any of the structures or compositions within the scope of the claim is known in the prior art." *Brown v. 3M*, 265 F.3d 1349, 1351, 60 USPQ2d 1375, 1376 (Fed. Cir. 2001). See also MPEP § 2131.02.

14. Furthermore, the transitional term "comprising", which is synonymous with "including," "containing," or "characterized by," is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. See, e.g., > *Invitrogen Corp. v. Biocrest Mfg., L.P.*, 327 F.3d 1364, 1368, 66 USPQ2d 1631, 1634 (Fed. Cir. 2003) ("The transition comprising' in a method claim indicates that the claim is open-ended and allows for additional steps."); < *Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir. 1997) ("Comprising" is a term of art used in claim language which means that the named elements are essential, but other elements may be added and still form a construct within the scope of the claim.); *Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261, 229 USPQ 805 (Fed. Cir. 1986); *In re Baxter*, 656 F.2d 679, 686, 210 USPQ 795, 803 (CCPA 1981); *Ex parte Davis*, 80 USPQ 448, 450 (Bd. App. 1948) ("comprising" leaves "the claim open for the inclusion of unspecified ingredients even in major amounts").

15. Finally, during patent examination, the pending claims must be "given *>their< broadest reasonable interpretation consistent with the specification." > *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000). While the claims of issued

patents are interpreted in light of the specification, prosecution history, prior art and other claims, this is not the mode of claim interpretation to be applied during examination. During examination, the claims must be interpreted as broadly as their terms reasonably allow. > In re American Academy of Science Tech Center, F.3d, 2004 WL 1067528 (Fed. Cir. May 13, 2004)(The USPTO uses a different standard for construing claims than that used by district courts; during examination the USPTO must give claims their broadest reasonable interpretation.) < This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) >; Chef America, Inc. v. Lamb-Weston, Inc., 358 F.3d 1371, 1372, 69 USPQ2d 1857 (Fed. Cir. 2004). There is not evidence of any special definition; therefore the words of the claims have been given their plain meaning.

Conclusion


16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

February 6, 2006


MARIA F. GUERRERO
PRIMARY EXAMINER